RSP-980

SURROUND SOUND
PROCESSOR

Owners Manual

Read all the instructions before connecting or operating the RSP-980. Pay particular attention to the safety information. Keep this manual so you can refer to these safety instructions.

This symbol is to alert the user of the presence of dangerous voltages inside the enclosure of the RSP-980. To reduce the risk of electric shock do not remove any parts of the RSP-980.

This symbol is to alert the user of important operating instructions in the owner's information accompanying the RSP-980.

WARNING:

There are no user serviceable parts inside. Refer all servicing to qualified service personnel. Please do not open the cabinet as this will expose you to the risk of shock from potentially dangerous high voltages. Unauthorized attempts at repair or modification will void your warranty. .

WARNING:

To reduce the risk of fire or electric shock, do not expose the RSP-980 to moisture or water. Do not allow foreign objects to get into the enclosure. If the unit is exposed to moisture, or a foreign object gets into the enclosure, immediately disconnect the power cord from the wall. Take the unit to a qualified service person for inspection and necessary repairs.

If you wish to clean the RSP-980's cabinet, please use a soft, DRY cloth. Don't use cleaning compounds or solvents as they may dull the finish, remove the labels, or damage circuitry if any residue falls inside.

Place the RSP-980 on a fixed, level surface strong enough to support its weight. Keep the RSP-980 away from radiators, heat registers, stoves, or any other appliance that produces heat.

Connect the RSP-980 to the power outlet only with the supplied power supply cable. The cable should be connected to a properly grounded 3-pin wall outlet. Do not modify the supplied cable in any way. Do not use extension cords.

Do not route the power cord where it will be crushed, pinched, bent at severe angles, exposed to heat, or damaged in any way. If the cable shows any sign of wear or damage, immediately stop using it and obtain a proper replacement from a qualified service agency or from the Rotel National Service Center.

If the RSP-980 shows signs of improper operation, or if it has been dropped or damaged in any way, immediately disconnect the power cord from the wall. Take the RSP-980 to a qualified service person for inspection and necessary repairs.

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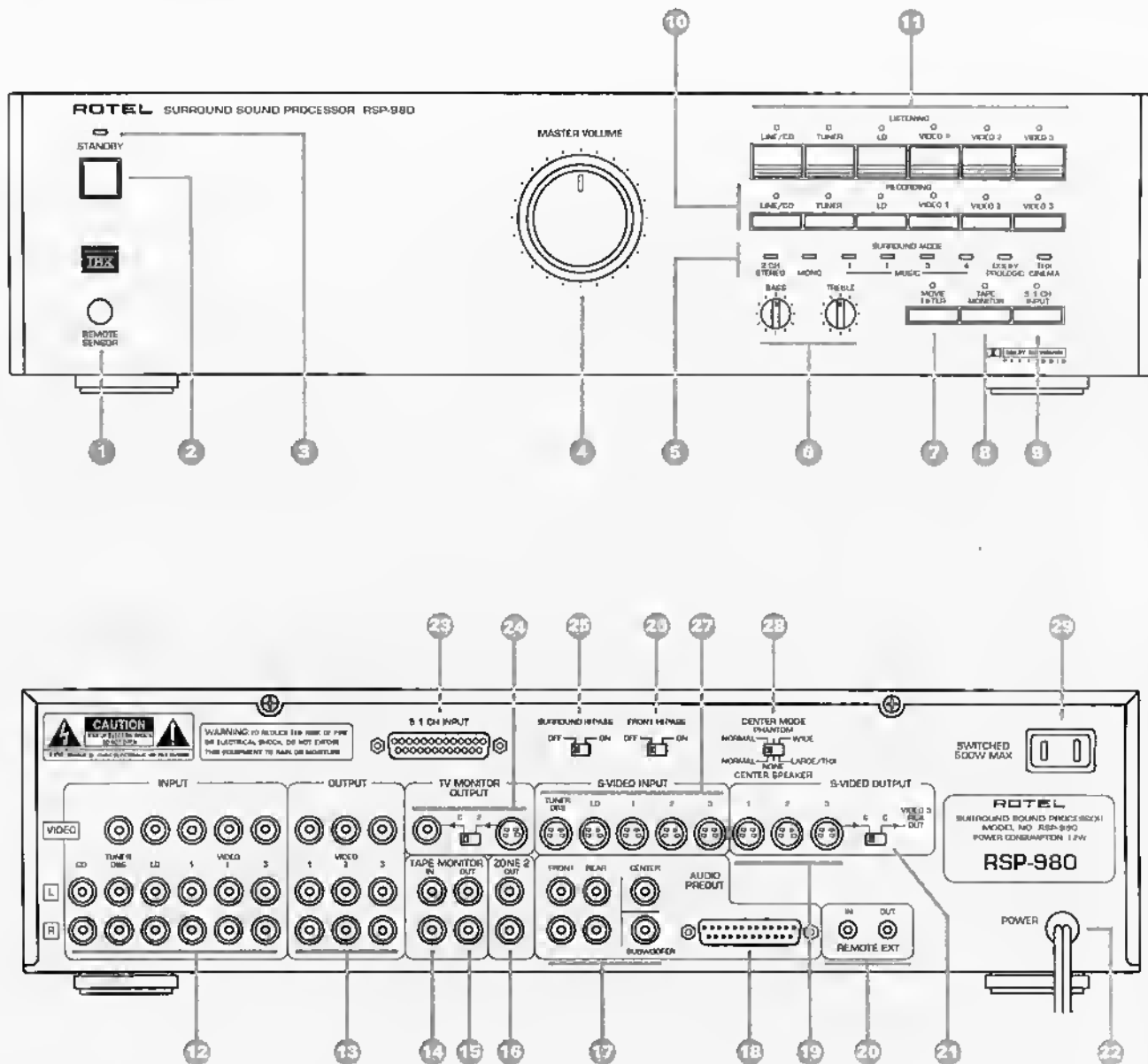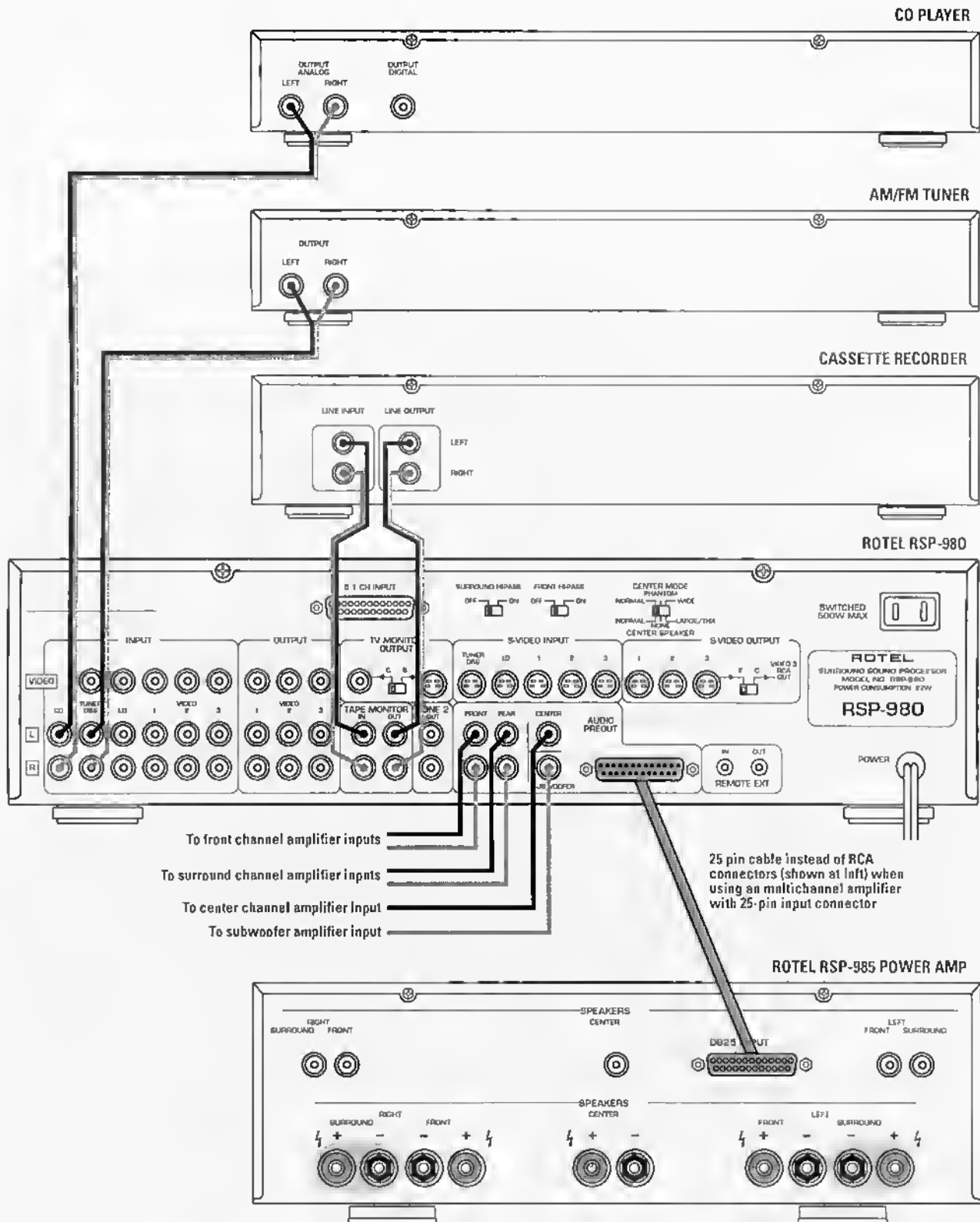
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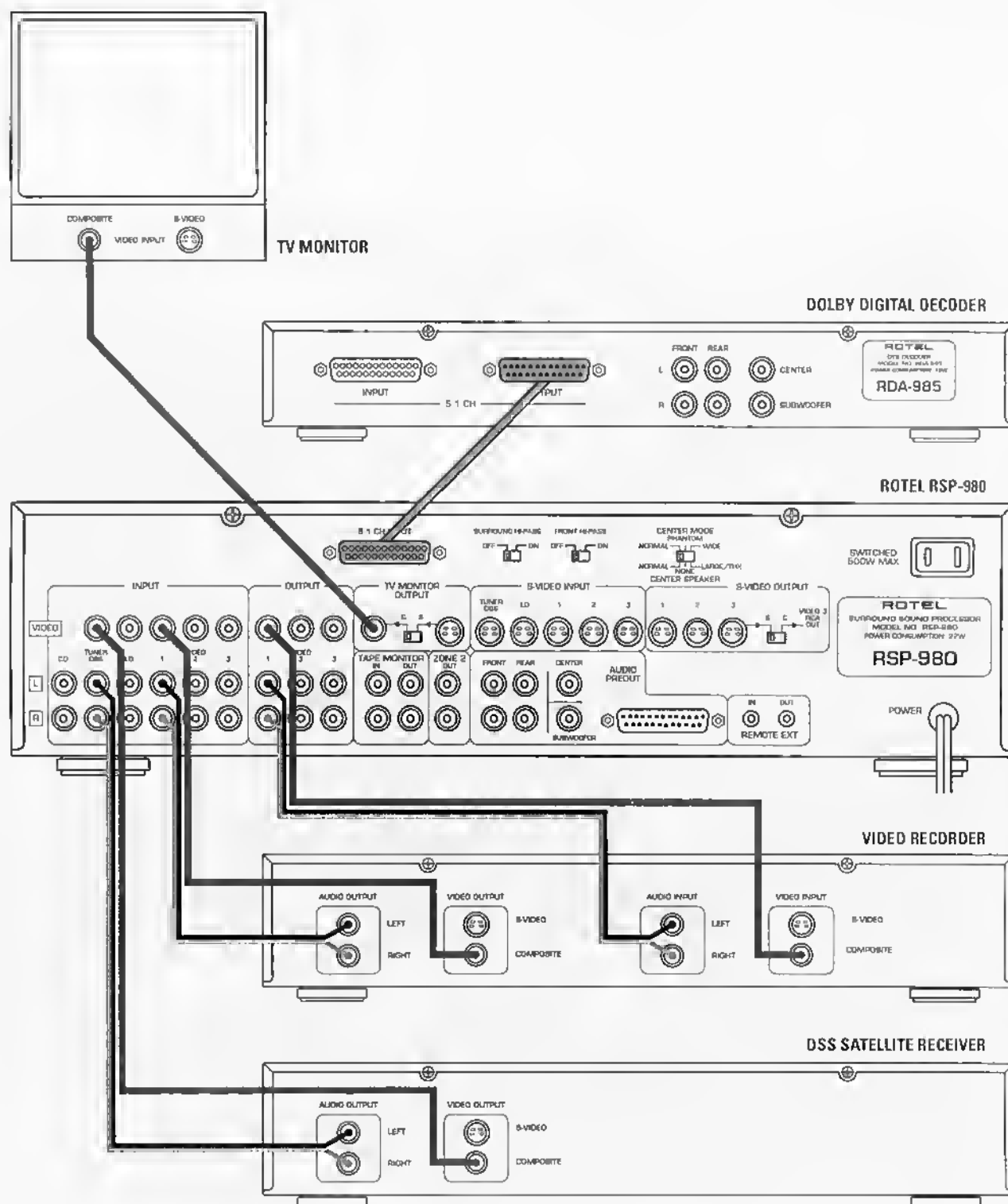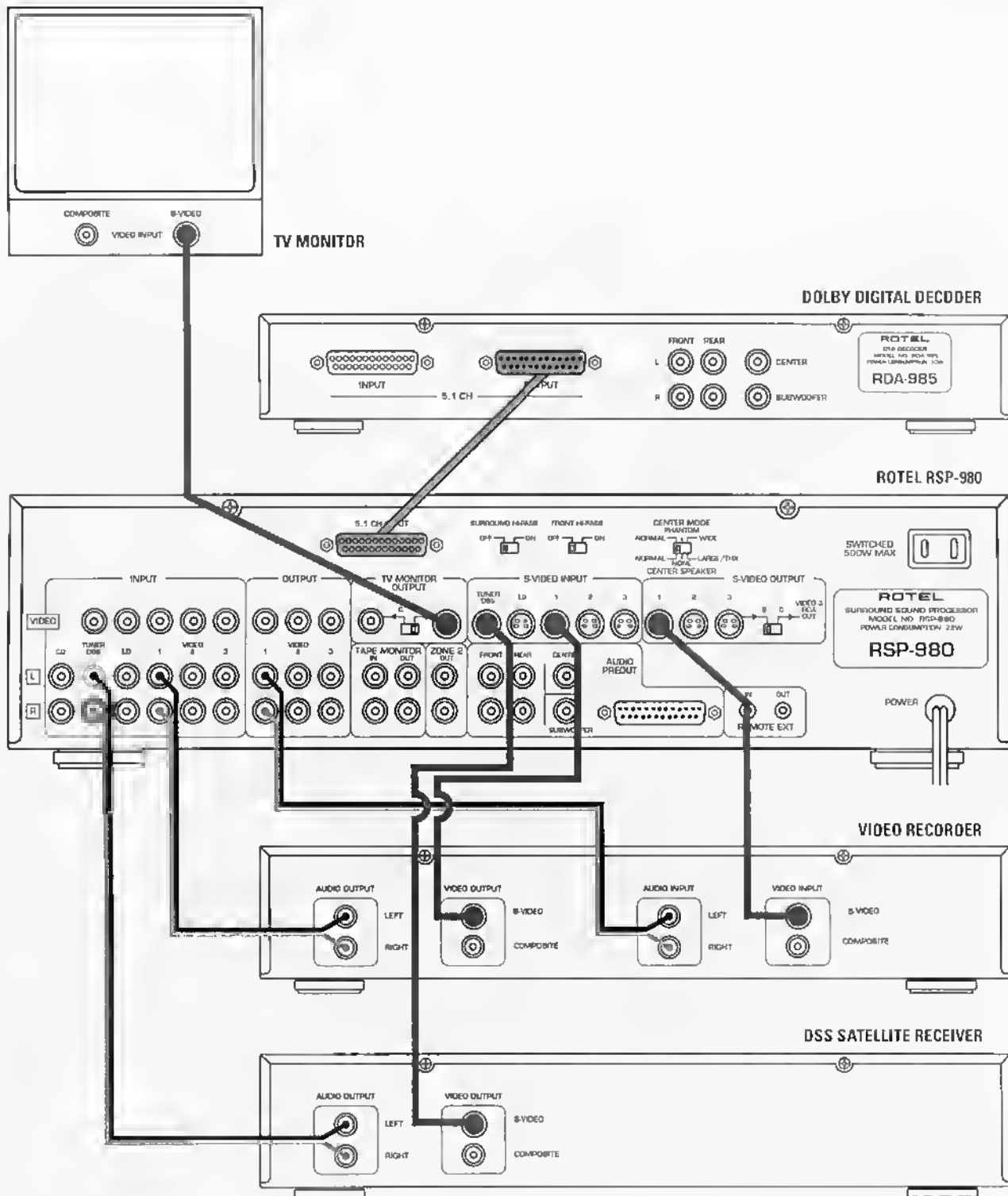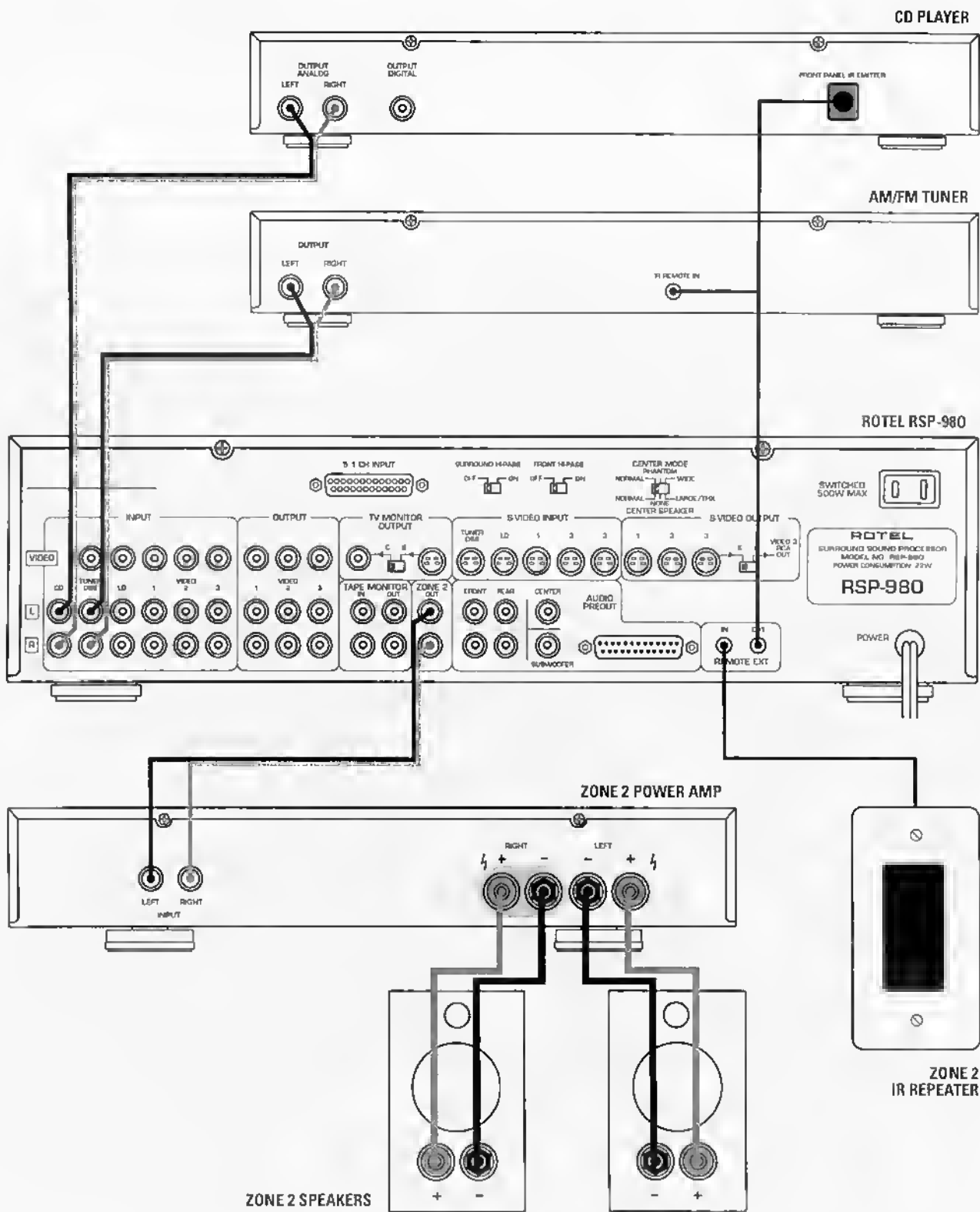
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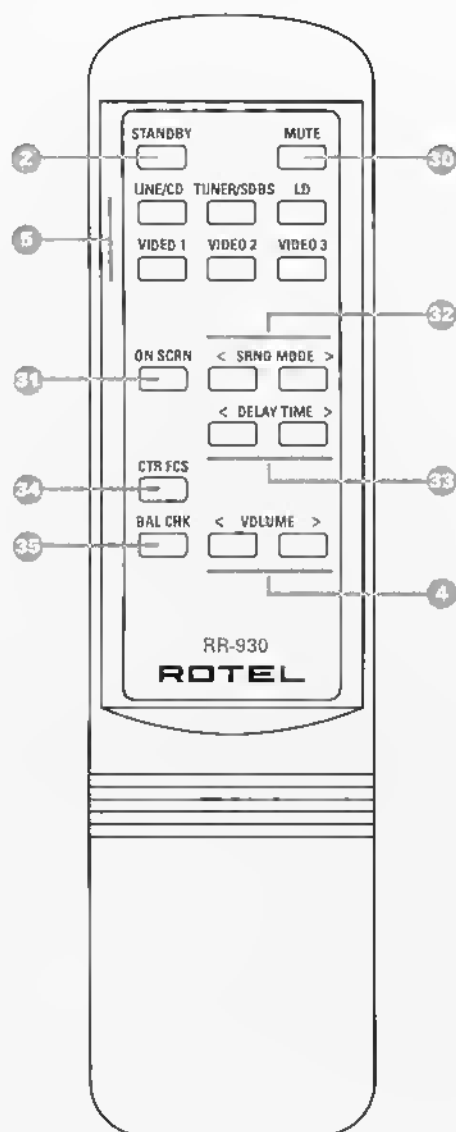
Getting started

First of all, thank you for purchasing our RSP-980 Dolby Pro Logic(r) surround sound processor. This THX(r) certified component will provide accurate reproduction of both movie soundtracks and demanding musical selections and is a natural extension of our well-known passion for good sound. We designed the RSP-980 to be durable, easy to use, and to accurately recreate the original input signal, whatever its origin.

The RSP-980 benefits from over 30 years experience in designing exceptional stereo components and the latest advances in surround sound processing to bring you accurate and natural reproduction of the widest variety of sources available today.

To get the most from your RSP-980, we strongly suggest you read this manual and keep it as a reference to answer any future questions. We've organized it so that your questions about different topics are handled as completely as possible in their own sections. Look at the Table of Contents for a quick orientation.

RSP-980 key features

- *Rotel's "Balanced Design" approach that combines advanced circuit board layout, comprehensive parts evaluation, and extensive listening tests for superior sound and long term reliability.*

- *THX certifification for excellent performance and sound quality with a wide variety of audio/video sources.*

- *5.1 channel input for Dolby Digital (AC-3) surround processing.*

- *User friendly On-Screen Display.*

- *DSP music modes for enhanced surround sound music listening.*

- *Comprehensive input switching with separate recording and listening controls.*

- *"Zone 2" output with independent input selection and level adjustments for multi-zone custom installations.*

- *Highly regulated power supply.*

- *Comprehensive rear panel input and output connections for audio and video sources.*

Unpacking the RSP-980

Your RSP-980 underwent quality control tests before we sent it on its way to you and should perform perfectly out of the box.

Simply remove it carefully from its packing. Look for the hand held remote controller and other accessories before putting the packing material back in the box. Although space is usually tight in today's homes, we recommend that you save the packing and box if possible as it will protect the RSP-980 if you move or need to return it to us for maintenance.

Where Does It Go?

Place the RSP-980 on a solid, dry, level surface away from direct sunlight, excessive heat, high humidity, or strong vibrations.

Make sure the RSP-980 is close to the other components in your audio/video system as that makes initial hook-up and any subsequent troubleshooting easier.

Furniture specifically designed to house audio and audio/video components is ideal as these racks and wall units provide many separate shelves. Well-designed component furniture reduces vibration, improves the looks of many system installations, and provides adequate amplifier ventilation. Ask your ROTEL AUTHORIZED DEALER for advice.

If at all possible, put the RSP-980 on its own shelf. This makes initial cable routing, hook-up, and any subsequent system changes easier. It also minimizes potential interference or heat build-up from other components.

Make sure there is enough room behind the RSP-980 — at least 5" of free space — for easy hook-up. Remember, you're connecting many other components to this unit and you'll probably need more space than you think.

Don't stack other objects (components or other items) on top of the RSP-980. Don't let water fall into the RSP-980 as this could damage delicate circuitry.

Plan your system! Careful installation and hook-up will pay many dividends in the years ahead.

Notes On Cable Routing

For best results, we strongly recommend that you group cables by function (audio connections, video connections, remote sensor/repeater connections, AC power cords, etc.) and keep similar groups as far apart from each other as practical. This usually reduces unwanted noise and hum.

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Front panel controls

Although we went to great lengths to make the RSP-980 as simple to use as possible, it is still a complex piece of gear. For that reason, we suggest you take a few moments and look over the RSP-980's front and rear panels before you actually start connecting other components to it. The following brief explanations will help you get familiar with the unit and are keyed to the numbers in the preceding drawings.

Standby LED Indicator ❸

The RSP-980 is similar to many of today's TV sets in that some of its circuitry (the central microprocessor, infrared sensor, etc.) remain powered at all times while the rest of the circuitry is turned on or off by the user. The Standby LED indicator glows whenever the RSP-980 is plugged into a live AC outlet but does *not* necessarily mean that the RSP-980 is totally active. If other front panel LEDs are lighted, then the RSP-980 is fully functional.

Standby Switch ❷

Similar to a "Power" switch in function, this button switches the RSP-980 from standby mode to fully active mode. If only the Standby LED is lighted, push the front panel (or handheld remote Standby button) to fully activate the RSP-980. You'll see other LEDs light up. Push the Standby switch again to deactivate the RSP-980. You'll see that only the Standby LED remains lit.

The Standby Switch is duplicated on the RSP-980's handheld remote contol.

Note: The Standby switch also controls the rear panel AC convenience outlet. When the RSP-980 is "off" (in "Standby" mode) the AC outlet is also off. When the RSP-980 is fully functional, the AC outlet is live.

Remote Sensor ❶

This sensor receives infrared signals from the handheld remote control. Make sure you do not accidentally block this sensor with cables or accessories.

Master Volume Control ❹

Turn this control clockwise to raise and counterclockwise to lower the volume to all six main output channels (Left Front, Center Front, Right Front, Left Surround, Right Surround, and Subwoofer) simultaneously.

Master volume controls are also available on the RSP-980's handheld remote control.

Note: The Master Volume control is mechanically-connected to an internal servo-motor and responds to commands from the handheld remote. It will rotate in the appropriate direction automatically when adjusting the volume from the remote control.

Use the position of the LED indicator on the knob's outer edge to determine relative volume settings. When the volume control LED blinks, you've engaged "Mute" from the remote controller. A bar graph volume indicator also appears on he On-Screen Display. This volume bar graph will blink when "Mute" is engaged.)

Note on THX volume settings: The Master Volume control's "0 dB" setting provides the most "accurate" playback of a THX movie soundtrack in your listening room. This results from the fact that all THX certified components, regardless of manufacturer, are "system engineered" with specified input sensitivities and output level capabilities for maximum compatibility.

The "0 dB" position is indicated by a front panel marker at the "12 o'clock" position just above the volume control and by the On-Screen Display's numerical reference (0 dB) and a square block just to the right of center in the Master Volume bar graph.

After proper calibration, a THX system set to the "0 dB" mark will reproduce undistorted peak levels as high as 105 dB SPL. This matches the conditions under which the soundtrack was originally mixed and insures that you will hear things exactly as the director and sound engineers intended.

Please remember that the "0 dB" mark is thus a reference and not a requirement. You may well feel that a soundtrack played at this level is far too loud, especially for late evening viewing. Please feel free to lower the volume to a more peaceful level whenever you wish. The relative channel-to-channel balance (and hence the soundtrack's sense of spaciousness) will not change, only the overall volume will drop. This is one time where your enjoyment and peace with the neighbors comes before accuracy!

Listening Source Selector Buttons ⑪

These large front panel pushbuttons allow you to directly select an audio or video input source component such as a CD player, VCR, etc. Simply push any of these buttons to select the source connected to the corresponding rear panel inputs. (The handheld remote has functionally identical buttons.) You will hear this source and, if you have selected a video source, see its picture on your TV monitor.

An LED indicator immediately above each pushbutton lights to confirm your selection.

Note: Pressing the front panel 5.1 CH INPUT button overrides all other inputs and deactivates the normal input LEDs. To reactive normal input selection and LED confirmation, deselect the 5.1 CH INPUT by pressing that pushbutton again. (There is no corresponding 5.1 CH INPUT pushbutton on the remote controller.)

Recording Source Selector Buttons ⑩

The RSP-980 allows you to listen to and/or watch one source while simulaneous recording from a second source to an audio tape deck . This allows you to listen to a videotape, for example, while recording a CD. The row of smaller front panel buttons allows you to select any source for recording. It's signal is routed to to the rear panel Tape Monitor outputs and has no effect on the source selected for listentsing. LEDs immediately above each pushbutton light to confirm your selection.

Note: The handheld remote does NOT have corresponding buttons for selecting a second source for recording.

Surround Sound Mode LED Indicators ⑤

The RSP-980 provides 8 different surround sound modes to accomodate different types of audio and video source material as described below. These LEDs tell you which surround sound mode you've selected.

Note: Surround sound mode selections can only be made using the handheld remote's Surround Mode pushbuttons. There are no front-panel section buttons.

Here is a brief description of the various surround sound modes. See the section of "DSP Surround Modes" section of this manual for a full explanation of when to use the various settings.

2 CH STEREO is a conventional 2-speaker stereo direct bypass mode with no surround sound or other processing. The Front Left and Right speakers are on, all other speakers (including subwoofer) are off.

MONO sends all information to the center channel speaker if you've selected "Normal" or "Wide" center mode or to the main Left and Right speakers if you've selected "Phantom" center mode. (See section XXX for more information.) All other speakers (including subwoofer) are off.

MUSIC 1, MUSIC 2, MUSIC 3, and MUSIC 4 provide successively more expansive soundfields and are primarily used to recreate ambience when listening to music sources. Music 1 is the most intimate while Music 4 produces the reverberation and time delay characteristics typical of an outdoor arena. Experiment to determine which mode best matches your chosen source. All speakers are on in all Music modes.

Note: These modes are labeled differently on the RSP-980's On-Screen Display than the LEDs. However, all processing parameters are identical.

Front Panel LED		On-Screen Display
MUSIC 1	=	MUSIC
MUSIC 2	=	JAZZ
MUSIC 3	=	CONCERT
MUSIC 4	=	STADIUM

DOLBY PRO LOGIC provides proper playback processing for any Dolby Surround encoded source, whether it be a music CD, videotape, videodisc, conventional stereo TV broadcast, or satellite broadcast. (Look for the ▯▯ DOLBY SURROUND logo on the package or program.) Dolby Pro Logic processing and playback through a properly calibrated system will preserve the directionality, ambiance, and spatial effects intended by the source's producers.

THX CINEMA adds special circuits developed by Lucasfilm, Ltd. to enhance signals already processed by the RSP-980's Dolby Pro Logic decoder. These circuits include Re-Equalization, Timbre Matching, Decorrelation, and Bass Management. (See Section XXX for further explanation.)

Tone Controls ⑧

Bass and Treble controls increase and decrease the audio signal's low and high frequency content. Rotate each one clockwise to increase output in the respective frequency range and counterclockwise to reduce it. The center "detent" removes each control from the audio path for maximum signal integrity.

Movie Filter ⑦

This button activates circuitry that reduces high-frequency response and is particularly useful for removing excessive high frequency content from older film soundtracks.

Tape Monitor ⑧

This switch overrides the normal Listening Source Selectors to listen to whatever source component is connected to the Tape Monitor Input jacks. A confirming LED will light whenever the Tape Monitor switch is depressed.

Note: Although you can select any normal input by pressing a Listening Source Selector button and get confirmation from the source LEDs while the Tape Monitor button is depressed, you will not hear a signal from a normal input until you release the Tape Monitor button.

5.1 Channel Input ⑨

This button overrides all other input selectors *including the Tape Monitor Switch* and directly connects an external Dolby Digital/AC-3 adaptor (such as Rotel's RDA-980) to the RSP-980's master Volume control. This allows the RSP-980 to remain the central controller for even the most advanced audio/video systems.

When using the 5.1 CH INPUT, all of the RSP-980's normal surround modes and system calibration settings are bypassed. Channel balance, dynamic range, time delay adjustments, etc. are controlled by the optional RDA-980 Dolby Digital adaptor.

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RR-930 Remote Control

The RR-930 remote controller is specifically designed for the RSP-980. and it's simplified design makes it ideal for day-to-day use with the RSP-980.

Note: Rotel offers a variety of optional programmable and learning remotes that will operate all Rotel remote capable components and most of the RSP-980's functions. See your Rotel audio specialty dealer for additional information.

You may notice a slight hesitation in the RSP-980's response when you move from button to button on the RR-930. This is intentional and gives the microprocessor sufficient time to verify and process a command before accepting another. If the RSP-980 does not immediately respond to a remote-generated command, simply wait an instant and push the button again.

The following section provides an overview of the controls available on the standard RR-930 remote control included with the RSP-980. Note that first three functions simply duplicate the

RSP-980 front panel controls and are listed here only for your reference. Please refer to the previous 'Front Panel Controls' section of this Manual if you need additional information.

Standby Switch ②

Duplicates the function of the Standby Switch on the front panel. Press to activate the RSP-980. Press again to deactivate.

Master Volume Controls ④

A pair of buttons which duplicate the function of the front panel volume control. Press VDLUME < to reduce the volume and press VDLUME > to increase the volume.

Note: When you adjust the volume from the remote control, a servo-motor will physically turn the volume knob on the RSP-980 front panel.

Listening Source Selector Buttons ⑪

A row of six buttons (LINE/CD, TUNER/SDBS, LD, VIDEO 1, VIDEO 2, VIDEO 3) which duplicate the function of the Listening Source Selector Buttons on the RSP-980 front panel. Select any input source by pressing the appropriate button.

Note: The Recording Source selection function is not available from the remote control.

Mute Button (remote only) ㉚

Push this button once to reduce all AUDID PREDUT (RCA and DB25) levels to 0 – in other words, to turn the sound "off". To provide visual indication that the sound is muted, the front panel volume control LED and Dn-Screen MASTER LEVEL indicator will blink to indicate MUTE mode.) Press the MUTE button again to restore previous volume levels.

On-Screen button (remote only) ㉛

Push this button to turn on the Dn-Screen Display. If the Dn-Screen Display is already visible, push this button to cancel the Display.

Note: The RSP-980 On-Screen Display will automatically be turned off following ??? seconds without any control activity.

Surround Mode Buttons (remote only) 🔵32

Steps sequentually backwards or forwards through various surround sound operating modes:

2 CH STEREO
MONO
MUSIC 1 (Music)
MUSIC 2 (Jazz)
MUSIC 3 (Concert)
MUSIC 4 (Stadium)
OOLBY PRO LOGIC
DOLBY PRO LOGIC/THX

Your current selection will be indicated by front panel LEDs and by the On-Screen Display as you step through the available options.

The different Surround Mode choices provide a variety of "acoustic environments" to complement your source.

2 CH STEREO is a conventional 2-speaker stereo direct bypass mode with no surround sound or other processing. The Front Left and Right speakers are on, all other speakers (including subwoofer) are off.

MONO sends all information to the center channel speaker if you've selected "Normal" or "Wide" center mode or to the main Left and Right speakers if you've selected "Phantom" center mode. All other speakers (including subwoofer) are off.

MUSIC 1, MUSIC 2, MUSIC 3, and MUSIC 4 simulate the natural ambience of live concert venues and are suitable for use with any music source. MUSIC 1 provides the characteristics of a smaller room than does MUSIC 2 and so forth. MUSIC 3 is ideally suited for source material originally recorded in larger spaces such as concert halls. MUSIC 4 approximates the acoustic characteristics of an outdoor concert or sports event. Consequently, it offers fewer "reflections" to better emulate the way you hear where there are no walls or other close surfaces.

OOLBY PRO LOGIC is intended for any CD, videotape, or broadcast containing a Dolby Surround encoded soundtrack.

THX adds circuits to process a Dolby Surround encoded signal after Dolby Pro Logic decoding allocates channel-by-channel information properly. THX circuitry includes:

• *Re-Equalization™* to filter the soundtrack's high frequency content to correct for the differences between theatrical and home playback. and prevent an excessively bright, strident sound when certain movie soundtracks are played on a high-quality home theater system.

• *Timbre Matching™* to smooth the transitions between front and surround speakers by implementing a complex equalization curve on the surround signal. This special EQ compensates for the fact that the very shape of our ears contours sounds coming from behind and above us in a different way than sounds coming from in front of us. THX's Timbre Matching circuit makes sure that front-surround transitions (called "pans") are glitch-free.

• *Decorrelation™* to enhance the apparent spaciousness of Dolby Pro Logic's mono surround channel signal by splitting the surround output of a Dolby Pro Logic decoder and then slightly shifting pitch and phase relationships between each leg of that signal. The circuit helps enhance the diffuse nature of the surround soundfield and widen the listening area.

• *THX's Bass Crossover* removes low frequency information from the signals sent to the front speakers and re-routes it to a dedicated subwoofer. In addition to more accurate bass response, this circuit enhances the dynamic performance of the main front speakers by freeing them from the demands of bass reproduction. The improvements benefit the entire midrange — dialog intelligibility in particular.

Delay Time buttons (remote only) 🔵33

The digital signal processing in the RSP-980 delays the signal sent to the rear surround speakers as a means of simulating a larger physical space (such as a movie theater or concert hall) and to ensure that sounds from the front speakers reach your ear first. The Delay Time buttons (labelled DEL TIME) steps sequentially through various delay timed settings available for your selected Surround Mode.

You will get visual confirmation of your delay time settting on the Dn-Screen Display as you adjust the setting.

DELAY TIME possibilities vary as you select different Surround Modes and setting a different delay time for one surround mode has no effect on the others. This assures that your system will always provide convincing reproduction from mode to mode while still giving you latitude to meet particular conditions.

There are no hard and fast rules for setting proper delay time. Many listeners will be satisfied with the default settings. Others will want to experiment. In the end, it is a matter of personal taste.

In general, longer delay time settings will tend to create the illusion of a larger accoustic space, although if overdone, the effect can be exaggerated and unnatural. Longer delay settings may typically be more "spectacular". Shorter delay times may be more "natural".

Delay times also may need to be adjusted depending on the relative distance from the listening position to the front and rear speakers. As a generaly rule, your attention should never be drawn the surround speakers as a primary sound source, particularly when listening to music. If you are closer to the rear speakers, increasing the delay time may prevent this problem. See the Calibration section of this manual for specific instructions on setting the delay time for Dolby Surround mode.

The DELAY TIME choices for each SRND MODE vary as follows. The range of options varies, because the length of the delay time is one way that the RSP-980 uses to create different effects, particularly in the various MUSIC modes.

2 CH STEREO:	None. (No surround speakers used)
MONO:	Same as above.
MUSIC 1 ("Music"):	15, 18, 22, 25, & 30 milliseconds (ms).
MUSIC 2 ("Jazz"):	Same as above.
MUSIC 3 ("Concert"):	30, 37, 45, 55 & 65 ms
MUSIC 4 ("Stadium"):	45, 55, 65, 77, & 95 ms
DOLBY PRO LOGIC:	15, 18, 22, 25 & 30 ms
DOLBY PRO LOGIC/THX:	Same as above.

Again, experimentation will show you which settings are best for your source material, room conditions, and system setup.

Center Focus Button (remote only) (34)

The Center Focus Button (labelled CTR FCS) increases or decreaces the relative relative volume level of the center channel speaker in the four MUSIC surround modes. There are two settings for Center Focus – normal and increased. Push the button to increase center channel level, press again to restore normal level.

CTR FCS helps to stabilize a very wide left-right image by "collapsing" it slightly towards the center. Please experiment to find the optimum setting for your favorite sources. In general, increased center focus will tend to make singers and lead instruments more prominent.
The On-Screen Display will show the current Center Focus setting with either one dot (normal) or two dots (increased) on a line between the Delay Time and Master Volume indicators.

Note: The Center Focus button is only active when you have one of the four MUSIC surround modes selected. It has no effect in the other surround modes.

Balance Check (remote only) (36)

The Balance Check button (labelled BAL CHK) on the remote control is used during initial calibration of relative speaker volume levels for Dolby Surround playback. Generally, it is only used during intial setup of the system and not during normal operation. See the Calibration Section for full details.

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The On-Screen Display

Providing you've connected the RSP-980's monitor output to your TV and the TV is set to that input, the RSP-980's On-Screen Display automatically appears on your TV monitor whenever you take the RSP-980 out of "Standby" mode. When you do, the first screen you'll see is simply an ID screen that says:

After approximately 5 seconds, this Initial ID screen will disappear to be replaced by the main Operating screen which will, in turn, disappear (providing you do nothing more) within approximately 8 seconds.

Once the RSP-980 is fully powered, you will reactivate the Operating screen every time you:

• *Push any button on the remote controller,*

• *Change the Master Volume setting via the RSP-980's front panel control,*

• *Change a Listening input via the RSP-980's front panel pushbuttons.*

Once activated, the Operating screen will remain visible for approximately 8 seconds after your last control input.

Display information will appear over a blue background and will displace whatever video image your monitor was just showing.

If no other video image was present, the display information will disappear within 8 seconds but the blue background will remain. If another video image was present, both information and background will disappear within 8 seconds and the RSP-980 will automatically restore that image.

Note: You can turn off the On-Screen Display's Operating screen at any time by pressing the remote controller's ON SCRN button.

Operating Screen

As we've already shown, there are three display screens, Initial ID, Operating, and Balance Check (or Calibration.) The Initial ID screen is essentially passive and should not occupy your attention for any other reason than reassuring you that the RSP-980 is still connected to your monitor. You've probably seen the Balance Check screen during your initial set-up. (See Section 4 for more details.)

As shown by the diagram above, the Operating screen contains the following information:

1) **INPUT**
2) **SRND MODE** (Surround Mode)
3) **DELAY TIME**
4) **CTR FCS** (Center Focus) · visible only in the four Music modes
5) **MASTER LEVEL** (numerical indication and bar graph)

INPUT is almost self-explanatory: It simply tells you which of the six regular inputs (CD, TUNER, LD, VIDEO 1, VIDEO 2, or VIDEO 3) you have selected. When you choose the 5.1 CH INPUT using the mechanical selector (front panel, bottom right) the Operating screen will change to show ONLY MASTER LEVEL. This reflects the fact that the 5.1 CH INPUT goes directly to the Master Level control and is totally unaffected by any other operating change you may want to make. The Operating screen will revert to its normal display mode only when you deselect the 5.1 CH INPUT by pushing the button once again.

SRND MDDE (Surround Mode) is equally straightforward. Sequential pushes on the remote's SRND MDDE > button will cycle through 2 CH STERED, MDND, MUSIC 1 (indicated by "Music" on the Display), MUSIC 2 ("Jazz"), MUSIC 3 ("Concert"), MUSIC 4 ("Stadium"), Dolby Pro Logic, and Dolby Pro Logic/THX respectively. Using the SRND MDDE < button simply reverses the sequence.

DELAY TIME shows the currently selected delay figure. (See Section 4.3.11 for an explanation of why proper delay time settings add to our enjoyment.)

Bypassing the On-Screen Display

The RSP-980 generates the Dn-Screen Display only at the TV Monitor output (composite or S-Video). If you prefer not to show the Display during normal system operation, connect the monitor to any available video output (VIDED 1, VIDED 2, or VIDED 3). See the section "TV/Monitor Dutput" under the heading "Rear Panel Signal Output Connections" for detailed hookup instructions.

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Rear Panel Input Signal Connections

This section of the manual provides complete information on all of the audio and video signal input connections on the rear panel of the RSP-980. For convenience, each topic begins with an overview of the particular connection, followed by detailed hook-up instructions.

There is no one-and-only way to hook up other components to your RSP-980. However, you'll undoubtedly need a distraction-free atmosphere and some patience, particularly if you're setting up your multi-channel home theater system for the first time.

ALL VIDED CABLES (composite and S-Video) SHDULD HAVE A 72 OHM IMPEDANCE RATING. Although conventional audio interconnects will pass a video signal, their construction and limited bandwidth imposes a performance penalty because, in part, they do not adhere to the 72 ohm standard.

You should also know that the S/PDIF digital audio interface standard specifies a 75 ohm transmission line and that all good digital cables adhere to this requirement. Because the video and S/PDIF standards are as close as they are, you can safely use a video cable for digital audio data transmission and, conversely, a digital audio cable for video data transmission. We strongly advise that you NDT substitute a conventional analog audio interconnect cable for either digital or video.

Note: DO NOT plug any system component into an AC source until system hook-up is complete. Wait to apply power until you're confident that all component-to-component connections have been properly made.

RCA Source Audio and Video Inputs: ⑫

[See Figure 2 and Figure 3 for hookup illustration]
These six sets of RCA-type inputs (CD, TUNER/DBS, LD, VIDED 1, VIDED 2, AND VIDEO 3) accept line level audio and composite video signals from various source components. Except for CD, an audio-only input, all source inputs accept both left and right channel audio plus a video signal.

Note: In addition to the RCA-type video inputs, the RSP-980 provides alternative S-Video connections for all video inputs. You should make the decision to use composite or S-Video connections before you start and on a system-wide basis. If all of your audio/video source components AND YOUR TV/MONITOR have S-Video connections, we suggest that you use them to enjoy the extra resolution S-Video can deliver. However, unless all of your video components, including your TV monitor feature S-Video connections, you should use the RCA-type connections. See S-Video section below.

All RCA-type connections on the RSP-980 follow these standard color codes:

Left channel audio = RCA jack with white inset
Right channel audio = RCA jack with red inset
Composite video = RCA jack with yellow inset

Connect the DUTPUTS of your source components to the appropriate INPUTS on the RSP-980. For example, if your system includes a CD player, connect its Left and Right channel analog outputs to the RSP-980's LINE/CD inputs.

If your system includes a separate tuner (audio only or audio/video), connect its analog audio outputs to the RSP-980's TUNER/SDBS audio inputs and its video output (if applicable) to the appropriate composite.

The same instructions apply to the LD, VIDED 1, VIDED 2, and VIDED 3 inputs. Remember to use only your LD player's analog audio outputs to connect to your RSP-980's LD audio input jacks.

Note: If you wish to enjoy a turntable/phono cartridge combination with the RSP-980, please connect an external phono equalizer, such as the Rotel RQ-970, to one of the RSP-980 line-level inputs. This will amplify very low-level phono cartridge signals for use by the RSP-980.

S-Video Source Inputs ㉗

[See Figure 4 for hookup illustration]
These mini-DIN inputs allow the RSP-980 to receive S-Video signals from appropriately-equipped source components as an alternative to the standard RCA video inputs described above.

You should make the decision to use composite or S-Video connections before you start and on a system-wide basis. If all of your audio/video source components AND YDUR TV/MDNITDR have S-Video connections, we suggest that you use them to en-

joy the extra resolution S-Video can deliver. However, unless all of your video components, including your TV monitor feature S-Video connections, you should use the RCA-type connections.

If you opt for S-Video connections, remember that very long S-Video cable runs can cause significant signal degradation. In some difficult system configurations, composite connections may actually be preferable. Consult your Rotel dealer for details. In all cases, keep your cables as short as possible to insure the best performance.

Note: You may NOT get the best signal from your LD (Laser Disc) player by using the S-Video output. Because the LD format itself is older, the LD player does not develop a S-Video output in quite the same way as a more recent S-Video source component. LD players add a circuit to separate the luminance (black and white) from the chrominance (color) information that make up the complete video signal. This extra circuitry may actually degrade the apparent resolution of an LD player's S-Video output. You'll need to experiment to determine which output provides a sharper picture in your system.

Having made the system wide decision to use S-Video connections, hook-up is straightforward. Simply connect the S-Video output of each video source component to the appropriate S-Video input on the back panel of the RSP-980. Remember that you will still need to use the RCA-type connections for the left and right audio signal from each source component.

When connecting multiple video source components, make sure that all audio and video signals from one component connect to the corresponding inputs on the RSP-980. For example, do not connect the audio outputs from a VCR to the RSP-980's VIDEO 2 audio inputs while connecting the VCR's video signal to VIDEO 1's video input.

5.1 Channel Audio Input ㉓

[See Figure 2 for hookup illustration]
This 25-pin input connects six discrete channels of analog information from an outboard processor (Dolby Digital/AC-3 or DTS, for example).

Many external adaptors provide a choice of either RCA and DB25 outputs. We suggest that you use a DB25-to-DB25 cable to reduce the number of cables and to insure proper channel-to-channel continuity. The DB25 connector is shaped to go into the RSP-980's receptacle only one way. There is never a question of mistakenly connecting, for example, the external adaptor's Left Front output to the RSP-980's Right Rear input.

If your external adaptor does not have a DB25 output, you will need to purchase a multi-RCA to DB25 adaptor cable from your Rotel dealer. Make sure to observe proper channel continuity.

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Rear Panel Output Signal Connections

This section of the manual provides complete information on all of the audio and video signal output connections on the rear panel of the RSP-980. For convenience, each topic begins with an overview of the particular connection, followed by detailed hook-up instructions.

RCA-type Source Audio and Video Outputs ⑬

[See Figure 2 and Figure 3 for hookup illustration]
These three output sets (VIDEO 1, VIDEO 2, AND VIDEO 3) include left and right channel audio plus composite video output from the RSP-980 to appropriate components (VCR, etc.) for recording or further processing. Standard color coding applies.

In conjunction with the source inputs described above, the VIDEO 1, VIDEO 2, and VIDEO 3 outputs are intended to make video recording or dubbing easy and trouble free by using the RSP-980's internal switching circuitry. You can route signals FROM UP TO THREE VIDEO SOURCE COMPONENTS TO YOUR RSP-980 using the input connections and FROM YOUR RSP-980 back to three video source components using the output connections.

Note: Again, the RSP-980 offers a choice of composite and S-Video connections. This sections describes the use of the standard composite video output. See below if you have made a system-wide decision to use S-Video connections.

Connect the RSP980's VIDEO 1 left and right audio outputs to the audio inputs of the first source component. Then, connect the VIDEO 1 composite video ouput to the video input of the same source component.

Repeat these steps for Video 2 and Video 3 connections. Just substitute the IO "VIDEO 2" or "VIDEO 3" as appropriate and remember to route your cables to and from the proper jacks on the RSP-980's rear panel.

To avoid mistakes, make sure you always route cables:

• *Always connect the source component's **outputs** to the appropriate RSP-980 **inputs***

• *Always connect the appropriate RSP-980 **outputs** to the proper source component **inputs**.*

• *Always make sure that whatever video component is connectet to the VIDEO 1 inputs is the same component connected to the VIDEO 2 outputs.*

Again, a bit of patience will pay off. Just take your time — you'll get there!

S-Video Outputs ⑲

[See Figure 4 for hookup illustration]
These mini-DIN outputs give you the option of routing S-Video signals from the RSP-980 to appropriately-equipped components if you have made the system-wide decision to use S-Video connections instead of the standard composite video connections described above.

If you have opted for S-Video conntections, connect the S-Video outputs for VIDED 1 to the S-Video input on your first the source component.

Remember that you are merely substituting an S-Video connection for the standard RCA-style composite video connection.that Your audio connections will still use the RCA outputs described above. Also remember to observe the same component-to-component continuity between audio and video signals described above.

Repeat the same process using VIDED 2 and VIDED 3 if you have additional video source components.

Video 3 S-Video Selector ㉑

As already noted, the decision to use S-Video connections is a system-wide choice and should only be made if all of your compoentnets feature S-Video connectors. However, there is one exception to this rule:

As a convenience, the RSP-980 offers the ability to record onan older VCR lacking S-Video connections — even when you have chosen S-Video as your preferred video format.

To take advantage of this feature, you use the selector switch to convert an S-Video signal to composite format and route that converted signal to Video 3's composite (RCA) output.

Connect the older VCR's video input from the RSP-980's VIDEO 3 composite (RCA) video output via a standard 72 ohm video cable and slide the two position switch TD THE RIGHT. This will route the chosen video signal through a format converter (S-Video to composite) and send it to the VIDED 3 composite output.

Dnly use this convenience feature if necessary. If all of your VCR's have S-Video connectors, then leave the switch in the LEFT position and use the S-Video output for VIDED 3, just as you have for VIDED 1 and VIDED 2.

To Record Input on Dubbing VCR

Move switch to right to convert S-Video signal to composite output

Main Preamplifier Audio Outputs (RCA) ⑰

[See Figure 2 for hookup illustration]
These outputs (6 individual RCA-style jacks direct the RSP-980's main output to power amplifiers and speakers for the primary listening/viewing area.

These six RCA outputs (Left Front, Center Front, Right Front, Left Surround, Right Surround, and Subwoofer) connect the RSP-980's main audio output to a multi-channel power amplifier or multiple power amplifiers for the primary listening area via six individual RCA-style jacks.

Standard color coding applies with black insets to distinguish center channel and subwoofer outputs from Left (white) and Right (red) Front and Rear outputs.

Note: As an alternative to the RCA-outputs , the RSP-980 also provides DB25 multipin output connector. These outputs (RCA and DB25) are in parallel. Do not use both simultaneously. Choose whichever is most convenient for your system hook-up.

The RSP-980's RCA outputs will provide the greatest flexibility as all consumer power amplifiers have RCA-style inputs. The penalty is that you will need up to six individual interconnect cables. In addition, you must guard against the possibility of misconnecting one of the RSP-980's outputs to an incorrect input on the power amplifier.

To hook up the RCA main audio outputs, connect a standard audio cable from each output to the input of the amplifier channel that will power the corresponding speaker. In a full homethearer system, you will need to make six different connections corresponsing to the six speakers (Left Front, Center Front, Right Front, Left Surround, Right Surround, and Subwoofer).

It is important to make sure that you have the correct output connected to theproper amplfier channel. Take you rtime and you will have no trouble getting it right.

Main Preamplifier Audio Outputs (Multi-pin) ⑱

[See Figure 2 for hookup illustration]
The RSP-980 provides an alternate 25-pin connector that may be more convenient that the six RCA-type outputs described above, if you are using a multi-channel power amplifier that accepts such a signal. This connector is wired in parallel to the RCA-outputs described above and provides exactly the same six channels of audio output.

The DB25 jack is a "one way only" connection that automatically insures proper channel continuity. A single DB25 cable carries signals for up to six channels of output from the RSP-980, thus considerably simplifying system hook-up.

Each output set (RCA or DB25) will provide exceptional sound quality. If you want a hook-it-up-once-and-forget-it installation, we suggest the DB25 connector. If you think you might want to experiment with different interconnect cables, the RCA outputs will be a better choice.
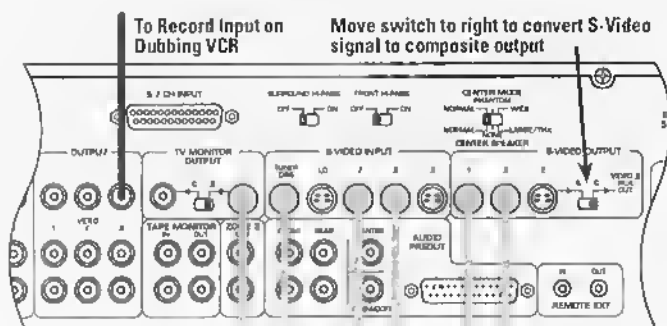
TV/Monitor Video Output & Selector Switch (24)

[See Figure 3 and Figure 4 for hookup illustration]
The video output of the RSP-980 can be sent to your TV monitor from an RCA-type composite video connection or an S-Video connection, depending on the format choice you've made for your particular system. The Selector switch between the two output connectors is used to select the appropriate type.(See Section XXX for more details.)

Based on the choice you've already made (see Section 1 above) between composite and S-Video connections, simply connect the appropriate output to the proper input on your TV or monitor and push the slide switch to the position matching the connector you are using.

For example, if you've chosen to use only S-Video connections, run an S-Video cable (with mini-OIN connectors) from the RSP-980's S-Video output to your monitor's S-Video input. Then slide the composite/S-Video switch to the right.

If you have chosen a composite interface, use the RCA output jack and slide the switch to the left.

Bypassing the On-Screen Oisplay
The RSP-980 generates an On-Screen Oisplay only at the TV Monitor output (composite or S-Video). If you prefer not to show the Oisplay during normal system operation, connect your TV monitor to any available video output (VIOEO 1, VIOEO 2, or VIOEO 3) instead of the TV/Monitor Outputs. This will supply exactly the same video source, but without any On-Screen Oisplay information.
If your TV monitor has two sets of user-selectable inputs, consider connecting the RSP-980's TV MONITOR output (with On-Screen capability) to one input while connecting the RSP-980's VIOEO 3 output (no On-Screen capability) to another input. You can then choose On-Screen Oisplay or no On-Screen Oisplay by switching to the appropriate input on your monitor.

Connect standard outputs to monitor for on-screen display

Connect alternate outputs to monitor to eliminate on-screen display

Tape Monitor Audio Outputs (16)

[See Figure 2 for hookup illustration]
A pair of RCA-type audio inputs and outputs are intended primarily for easy hook-up of an audio recording device (cassette deck, OAT, or Mini-Oisc recorder, etc.). You can also use these jacks to connect an external signal processor (equalizer, etc.) if needed.

If you have an audio tape recorder (cassette, OAT, Mini-Oisc, etc.), connect it now.

Route audio interconnect cables from your source's Left and Right analog outputs to the corresponding TAPE MONITOR IN jacks on the RSP-980's rear panel.

To complete connections, run another set of cables from the RSP-980's TAPE MONITOR OUT jacks to your recorder's analog inputs.

• •

Rear Panel Zone 2 Connection

The RSP-980 provides a second zone capability. You can power a second amplifier and pair of speakers in a second zone in your house. From the remote zone, you can select a source component (even if different from the source playing in the main listening room), adjust the volume level in the remote zone, and (depending on the remote control you are using) operate the source components.

To take advantage of the Zone 2 capability, you will need additional components including a pair of speakers installed in the remote zone and a power amplifier to drive them.

Zone 2 operation also requires the installation of an infrared repeater system such as a Xantech, Niles, etc. This repeater system relays infrared remote control commands from a hand-held remote to the "remote in" repeater input on the back of the RSP-980. This is the **only** way to operate the Zone 2 functions. See your Rotel retailer for additional information on repeater systems and their installation.

Here are several important points to keep in mind about the Zone 2 function:

• *An infrared repeater system (Xantech, Niles, et al)* **must** *be used for Zone 2 control via the 3mm "remote in" jack on the back panel*

• *Zone 2 is* **immediately** *active at a* **zero** *volume level when the RSP-980 is turned on.*

• *Zone 2* **cannot** *activate or deactivate the RSP-980. This must be done from the main listening room first.*

• *The RR-930 remote control supplied with the RSP-980 will operate Zone 2. The Rotel RR-927 remote control will operate Zone 2, plus all of the RSP-980 functions, plus* **all** *Rotel source components via the RSP-980's "remote out" jack.*
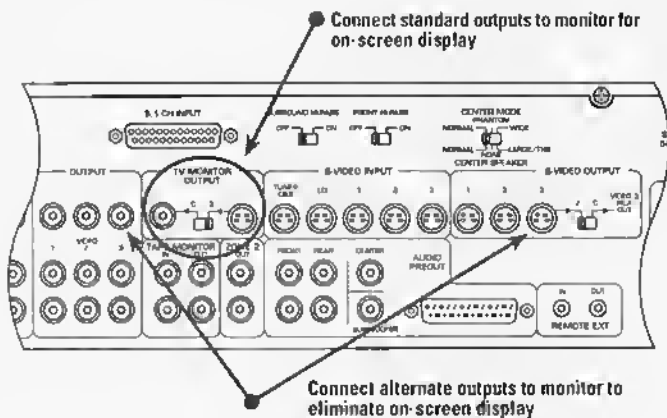
- *All source components connected to the RSP-980's audio inputs are available at the variable line level output for Zone 2. The Zone 2 outputs are independent of the main outputs. You can select a different source and raise or lower Zone 2 volume without affecting the Main outputs in any way.*

- *Avoid sending the same infrared command to the RSP-980 front panel sensor and the Zone 2 repeater at the **same** time. This means that Zone 2 **must** be in a different room from the RSP-980.*

Zone 2 Audio Outputs 🔞

[See Figure 5 for Zone 2 hookup illustration]
These variable line-level RCA-type audio outputs send the Zone 2 audio signal to a stereo power amplifer driving a pair of speakers in the remote zone.

Although you have the option of using an integrated amplifier or a receiver to power the remote speakers, we strongly suggest using a fixed-gain power amplifier. This simplifies system installation and operation. Your Rotel dealer may make another recommendation based on specific system requirements.

If you are configuing your system for Zone 2 operation, connect the left and right Zone 2 outputs on the RSP-980 to the left and right channels of the amplifier powering the remote speakers, using conventional RCA audio cables.

Remote External Sensor/Repeater Jacks 🔟

[See Figure 5 for Zone 2 hookup illustration]
These 3.5 mm mini-jacks allow your RSP-980 to send and receive command codes from industry-standard infrared transmitters and receivers via hard-wired connections.They are used in configuring your RSP-980 with the proper IR connections for Zone 2 operation.

These 3.5 mm mini-jack connections provide easy incorporation of third party infrared transmitters and repeaters (Xantach, etc.) for total control of custom installed and multi-zone systems.

The REMOTE IN jack accepts signals from infrared repeaters located in a remote area of your home. Among other uses, this receptacle is required for connecting a remote sensor/transmitter to enable operation of the RSP-980's ZONE 2 functions.

The REMOTE OUT jack sends signals from both the REMOTE IN jack ANO the RSP-980's front panel infrared sensor to a remote infrared repeater or to Rotel CO players, cassette decks, or tuners with a compatible rear panel remote connector.

Note: ZONE 2 MUST be in a different area from the main room. In particular, the RSP-980 should not be within range of Zone 2's remote controller. If signals from the Zone 2 remote controller reach the RSP-980's rear panel REMOTE IN jacks and front panel IR sensor at the same time, the RSP-980 will "lock up." If this happens, simply UNPLUG the RSP-980, reconfigure your system to avoid the problem, and then plug the RSP-980 into the wall outlet again. Press STANDBY to resume normal operation.

Rear Panel Speaker Configuration Switches

There are three speaker configuration switches on the RSP-980's rear panel — SURROUNO HI-PASS (On/Off), FRONT HI-PASS (On/Off), and CENTER MOOE (Normal/Phantom/Wide). These switches let you customize the RSP-980's main outputs to precisely match system configuration and speaker capabilities.

The SURROUNO HI-PASS and FRONT HI-PASS switches control a BASS CROSSOVER with a fixed "corner frequency" of 80 Hz.

The CENTER MOOE switch is also labeled CENTER SPEAKER (Small/None/Large-THX). Oo not let the labelling confuse you — there is only one switch!

These switches are crucial to proper system configuration and must be adjusted so that you enjoy all the performance your system can deliver.

Surround Hi-pass (On/Off) 25

SURROUND HI-PASS

OFF ⎯┐ ┌⎯ ON
▥

If your surround speakers are capable of sustained low frequency output (i.e., output substantially below 100 Hz), place this switch in the "Off" position. This insures that your surround channel speakers receive a full bandwidth signal whenever available from the RSP-980.

If your surround speakers have limited bass capability, place this switch in the "On" position. This limits the RSP-980's low frequency output to the surround channels so that the surround speakers are not overdriven. The result will be cleaner reproduction of ambience and effects information.

Note: When you place this switch in the "On" position, the bass information originally intended for the surround speakers is sent to the Subwoofer output instead. Consequently, fundamental tones are not lost but simply redirected to the speaker best able to handle them.

Front Hi-pass (On/Off) 26
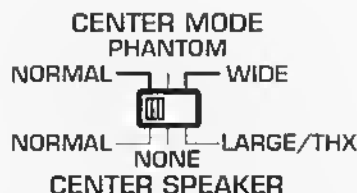
FRONT HI-PASS

OFF ⎯┐ ┌⎯ ON
▥

This switch performs the same function as the SURROUND HI-PASS switch but does so for the Front loudspeakers only.

Place the switch in the "Off" position if your main Left and Right speakers are full range designs with good bass response capability.

If you are using "satellite" speakers or other designs with more limited bass capability, put this switch in the "On" position to redirect bass frequencies to the Subwoofer output.

Note: Unfortunately, we can't cover every possible combination of speaker and switch settings in this Manual to provide specific recommendations. You'll need to use your own ears to make final adjustments. In particular, listen for bass overload (a "whuffing" or "pumping" sound caused by asking smaller speakers to produce more bass than they are designed to) and adjust the HI-PASS switches accordingly. Proceed slowly and enjoy. You may also want to discuss this with your ROTEL dealer.

Center Mode (Normal/Phantom/Wide) ㉘

```
        CENTER MODE
          PHANTOM
  NORMAL ──┐  ┌── WIDE
         [▥]
  NORMAL ──┘  └── LARGE/THX
          NONE
       CENTER SPEAKER
```

Dolby Pro Logic decoding derives much of its spatial accuracy from a Center Channel speaker located very close to a TV. This Center Channel speaker "anchors" dialog information (and other monaural signals) to your screen for greater coherence between the apparent point of origin for picture and sound.

Place this switch in the "Wide" ("Large-THX") position if your system's Center Channel speaker is capable of full-range, extended bass response.

In "Wide" position, bass frequencies below 100 Hz are handled by the Center Channel speaker as well as the Left Front & Right Front speakers if there is NO subwoofer in the system. When a subwoofer IS used, center channel bass content below 80 Hz is routed exclusively to it.

Use the "Normal" ("Small") position if your Center Channel speaker has more limited low frequency capability. Low frequencies below 100 Hz are redirected to the Front Left and Front Right speakers (or to a subwoofer) so they will not overload the center channel speaker. When NO subwoofer is used, all bass frequencies below 100 Hz are sent to the FRONT LEFT and RIGHT speakers. When a subwoofer IS used, bass from 100 Hz to 80 Hz is sent to the Left Front and Right Front speakers while bass below 80 Hz is sent to the subwoofer.

Set the switch to the "Phantom" ("None") position if your system does not have a Center Channel speaker. The RSP-980 then turns the Center Channel output OFF and divides the Center Channel signal equally between Left and Right Front speakers. If NO subwoofer is used, bass content is split equally between the

two main speakers. If the system includes a subwoofer, signals above 80 Hz will play through the main speakers only while bass below 80 Hz goes to the subwoofer.

Rear Panel AC Power Connections

AC power cord ㉒

Be sure the power switch on the front panel of the RB-991 is turned off (in the "out" position). Then, connect the supplied power cord to the AC power receptacle on the rear of the unit and the AC power outlet.

Your RB-991 is preconfigured at the factory for the proper AC line voltage in the country where you purchased it (either 115 volts AC or 230 volts AC with a line frequency of either 50 Hz or 60 Hz). The AC line configuration is noted on a decal on the back of your unit.

AC Convenience Outlet ㉙

This outlet lets you connect an accessory AC line filter/system switcher such as the Rotel RLC-900. The outlet is powered whenever the RSP-980 is fully active. It is off when the RSP-980 is in "Standby" mode. We DO NOT RECOMMEND that you use this outlet for a power amplifier.

Note: The AC outlet may be best used for the AC sensor cord of Rotel's RLC-900 Line Conditioner/System Switcher. Please see your Rotel dealer for full details on this system-enhancing product. The RLC-900 provides 11 filtered and group-isolated AC outlets (including 2 specifically for power amplifiers) as well as sequential turn-on and turn-off. It provides line ideal surge protection for today's complex home entertainment systems.

System Calibration

Proper system calibration (i.e., adjusting the output of all speakers to compensate for system and placement variations) is essential if you wish to enjoy a movie soundtrack as the director and sound engineers intended.

The goal is simple: Calibration seeks to equalize any speaker level differences caused by varying amplifier sensitivities, speaker efficiencies, and speaker locations — in other words, any possible system variations NOT controlled by the soundtrack itself. Once a system is calibrated, the only level differences left will be those dictated by the soundtrack.

What You'll Need

You need two items: A test tone generator and your ears. The RSP-980 already contains the generator. However, you will find two additional items very useful — an On-Screen Display (already included in the RSP-980) and a sound level meter.

Although you can perform a surprisingly accurate calibration with your ears alone, we strongly recommend an inexpensive sound level meter. You can purchase one at any Radio Shack or other electronics supply store for far less than a dinner at a moderately priced restaurant.

When using the sound level meter, set it to "Slow" response (to better average continuous readings) and "C" weighing (the "C" scale is more accurate for the type of measurement you need to do.) The following instructions will assume that you have a sound level meter.

How to calibrate your system

Step 1: Once your system is fully installed and connected, turn it on only AFTER you rotate the RSP-980's master level control fully counterclockwise (i.e., to minimum volume).

Step 2: Select Dolby Pro Logic operating mode by pressing the remote controller's SRND MODE < and > keys until the front panel mode LED over Dolby Pro Logic is visible. (The On-Screen Display will also show the operating mode as you select Pro Logic.)

Note: You can only calibrate the RSP-980 in Dolby Pro Logic surround mode. No other mode, including THX CINEMA, can be used for the calibration process.

Step 3: Press the remote controller's BAL CHK (Balance Check) button.

Two things will happen: The test tone generator will send a "pink noise" test signal to the Left Front speaker and the On-Screen Display will automatically show a calibration diagram entitled "Balance Check."

The Left Front speaker ID will blink to show that you can adjust that speaker's relative level. As you begin the calibration process, you will notice that the small numbers under each speaker ID read "0" to tell you that they are all set to their adjustment midpoints. (This will not be the case after calibration.) For your reference, the adjustment scale runs from -12 dB though +12 dB.

Place the sound pressure meter as close to where your ears will be during normal listening/viewing. Hold it at arm's length to reduce the impact of body reflections on the meter's readings. DO NOT hold the meter close to your body if at all possible. (Note: Most meters have a tripod socket to make stationary placement easier.)

Set the sound level meter's sensitivity scale so that the meter itself reads near its midpoint. (Begin with the sensitivity scale in the 70 dB range. You might have to switch up or down one click but this will give you a start.)

Make sure that there is no other noise in the room other than the sound of the test tone coming through the speaker. Note the meter's reading for future reference.

Step 4: Push the BAL CHK button again to advance to the Center Channel speaker. The test tone will cycle to that speaker and the On-Screen Display will change to tell you that the Center Channel speaker can now be adjusted.

Note the sound level meter's new reading. If it is lower than the Left channel reading, use the remote controller's VOLUME > button to adjust the Center channel's output until it matches the Left channel reading.

If the Center channel reading is higher than the sound level meter's Left channel reading, use the remote controller's VOLUME < button to lower it.

When the Center level equals the Left level (as read on the sound level meter, NOT the numbers under the On-Screen speaker IDs!), proceed to the next step.

Step 5: Push the remote controller's BAL CHK button again. This advances the test tone to the Right Front speaker and changes the On-Screen Display accordingly.

Note the new reading on the sound pressure meter. It should be very close to the readings you've already noted for Left and Center. If it is not, use the VOLUME < and > keys to match the previous readings.

Step 6: Push the BAL CHK button again. The test tone and On-Screen Display will cycle to the Right Surround speaker. Adjust that speaker's volume so that it matches the previous readings as closely as possible.

Step 7: Push the BAL CHK button again. The test tone and On-Screen Display will cycle to the Left Surround speaker. Adjust that speaker's volume so that it matches the previous readings as closely as possible.

Step 8: Push the BAL CHK button again. The test tone and On-Screen Display will cycle to the Subwoofer. Adjust that speaker's volume so that it matches the previous readings as closely as possible.

Note: You will probably have to cycle through this sequence several times to get the best results. Don't worry — this is normal. Just take your time and do this slowly as it is something you'll probably need to do only once.

We suggest that you jot down the numerical readings for each channel's relative balance so you can quickly restore them even if you do not have the sound pressure meter handy at the time.

Remember that we also said that you can perform a remarkable accurate calibration without a sound level meter? To do so, follow the steps above but use your "acoustic memory" rather than meter readings as the reference as you cycle from one speaker

to the next. This will probably mean that you'll need to cycle through each speaker a few more times but the results will be close to those obtained with a meter.

Step 9: When you're satisfied with the calibration, BAL CHK again. The On-Screen Display will show the Operating screen.

Step 10: Select the proper surround channel delay time by pressing the remote controller's DELAY TIME < or > buttons to see all the following choices: 15, 18, 22, 25, or 30 ms (milliseconds).

If you are equidistant from both front and surround speakers, or if you are closer to the front speakers than to the surround speakers, choose the 15 millisecond delay time.

If you are closer to the surround speakers than you are to the Front speakers, add 1 ms of delay time for every foot your listening position is closer to the surrounds and choose the delay preset closest to that ideal measurement. For example, if you are seated 15 feet away from your front speakers but only 5 feet from your surround speakers, a delay setting of 22 or 25 ms would be ideal.

Delay Time helps establish the Left, Center, and Right Front speakers as the primary sound sources by using a psychoacoustic phenomenon called the "precedence effect." In general terms, this simply says that, if you hear identical sounds from two sources, one closer to you than the other, you will think the sound came only from the closer source.

Pro Logic decoding involves some unavoidable leakage from front to surround channels. Time delay helps mask the resulting confusion to focus our attention on the front of the room where most aural action takes place.

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Using the RSP-980

When you first plug the RSP-980 into a live AC wall outlet, it automatically selects the following operational settings (called "initial defaults"):

Input:	LD (for both Listening and Recording)
Surround Mode:	Dolby Pro Logic/THX Cinema
Zone 2 output:	Tuner

During normal use, the RSP-980 will recall your previous selections whenever you turn the RSP-980 on again.

Note: Make sure you don't have the RSP-980 plugged into a switched AC outlet. If you do, and accidentally turn the outlet off when the RSP-980 is plugged into it, the unit will revert to the initial defaults. Also, you may experience some unexpected disturbances if you inadvertently interrupt the RSP-980's source of AC power while it is operating.

Overall Design

You'll understand the RSP-980 much better if you think of it as a switcher/controller for three separate activities conveniently housed in one chassis: Listening, Recording, and Zone 2.

The front panel LISTENING selectors choose the audio or video source you want to hear or view through your main system. They also route that source to the rear panel Tape Monitor outputs for recording. The Listening Input LEDs will confirm your choice.

You can also choose a LISTENING source via the remote controller — simply press any of the six grey pushbuttons immediately below the "Power" and "Mute" pushbuttons (RR-930 only.)

The front panel RECORDING selectors choose an audio or video input to appear at the VIDEO 1, VIDEO 2 or VIDEO 3 outputs for recording. Select your choice with the six smaller front panel RECORDING pushbuttons immediately below the row of LISTENING buttons. You can not select a RECORDING choice from the remote controller. LEDs will confirm your selection.

Note: As we've already mentioned, the 5.1 CH INPUT pushbutton (front panel, lower right) is a direct mechanical selector that overrides every other input choice AS FAR AS MAIN OUTPUTS ARE CONCERNED. You can not route the 5.1 CH INPUT to any recording output, either Tape Monitor or any of the VIDEO outputs.

ZONE 2: You can route any source (even a different one than you have chosen for either LISTEN or RECORD) to the rear panel ZONE 2 outputs for use in another room. You can also adjust volume for ZONE 2 playback. However, you can change ZONE 2 settings ONLY with remote command codes appearing at the RSP-980's rear panel REMOTE IN jack.

There are no front panel controls for ZONE 2 source selection or volume adjustment. Likewise, a remote control signal received through the front panel infrared sensor will have no effect. The On-Screen Display will NOT show any ZONE 2 functions.

DSP Modes

The RSP-980 includes several DSP (Digital Signal Processing) modes designed to enhance your enjoyment of any source, audio or audio/video.

In contrast to some competitive designs, however, we have avoided creating large amounts of false reverberation in the RSP-980's four MUSIC modes. Instead, we've concentrated on extracting as much realistic and natural ambient information as possible. You will notice that our approach drastically reduces "digital Ping Pong," an artificial effect that often obscures sonic detail. Rather, we think the source itself — the result of the aesthetic judgement of the producer and engineers — should be the controlling factor. Indeed, there are many compelling, scientifically valid reasons NOT to impose unnatural artifacts on any source.

Consequently, you'll find that the characteristics of the original recording will have a larger influence on final sound quality than they could if subjected to highly artificial manipulation.

The On-Screen Display's labels (MUSIC, JAZZ, CONCERT, and STADIUM) only hint at the acoustical characteristics typical of a particular venue. Please experiment to see which setting is most pleasing to you.

The only exception to this rule is our recommendation that you play all Dolby Surround-encoded sources using the Dolby Pro Logic mode. This insures optimum decoding accuracy and the most realistic recreation of the acoustic space intended by the source's creators.

Whether you choose to add THX enhancements to Dolby Pro Logic decoding is up to you. We suggest that Dolby Pro Logic alone will work very well for properly encoded audio-only sources and that you reserve THX circuitry for audio/video sources.

Some Comments about Speakers

Your speakers are the single most important component in determining its ultimate sound quality. Where you put them in your room is the most important decision you can make after you get everything home.

Rooms are very tricky. Essentially a resonant system (a mass of air bounded by walls, floor, and ceiling), all rooms influence how sound waves spread out from the speakers and how we perceive the result.

The following comments won't turn you into an acoustics expert but they will supply some thoughtful clues on how to proceed. Of course, we realize that the practicalities of daily living will guide your choices as much as anything else but we thought you'd appreciate some basic background to get you started.

As with everything else in the realm of home entertainment, you'll need to experiment a bit to get the best results. But if you relax and enjoy the opportunity to learn a bit, you'll drastically improve your system's ability to deliver what it's capable of.

Have fun!

Tonal Balance

Choose your home entertainment system speakers carefully. At Rotel, we consider wide frequency response (with or without a subwoofer), smooth octave-to-octave tonal balance, low distortion at normal operating levels, clarity, and definition absolutely essential. High power handling may also be desirable but this is a judgement call you need to make for yourself. If you anticipate shaking the foundations of your home, you might consider THX certified speakers as they have been tested at high volumes and will probably satisfy even gourmand-sized sonic appetites.

All speakers, especially the Left Front, Center, and Right Front, should match each other in tonal balance as closely as possible. In fact, these speakers should be acoustically identical but this is a difficult goal, particularly if you buy a center channel speaker from one manufacturer to complement a pair of main Left and Right speakers from a different manufacturer you already own. Ask your dealer for assistance here.

The best way to judge tonal balance is, surprisingly enough, not to use music or a movie soundtrack at all. These sources change too rapidly to allow us to judge tonal balances accurately. Instead, use the RSP-980's test tone generator or an unmuted FM tuner set to a frequency between actual broadcasts. In either case, you'll get a "rushing water" noise that will show speaker differences very quickly. If you're choosing a center channel speaker, use your main speakers as a reference: Pick a center channel speaker that sounds closest to them in sound quality. You'll be surprised at the differences you'll hear but we suspect that you'll find this time well spent.

Surround speakers present different challenges. In general, you don't need to match tonal balances as critically as you should for the front speakers. (After all, the very shape of your ears means that you hear sounds from the rear differently than you do sounds coming from in front of us.) However, that doesn't mean you should choose inexpensive speakers for surround information. They should match the front speakers as closely as possible to ensure smooth "pans" (transitions) from front to surround channels. Similar tonal balances between front and surround speakers also increases the effectiveness of the THX Timbre Matching circuits for even more realistic spatial reproduction.

What will you gain with properly matched speakers? The most important is a far better chance to create a seamless and coherent soundstage where side-to-side and front-to-rear movement is smooth and undisturbing. Sonic images will remain at the same apparent height as they move from side to side across the front and a Ferrari will not suddenly sound like a Lamborghini as it moves from right to center.

Proper speaker selection and matching is one of the not-so-subtle but often overlooked things that distinguish truly fine from merely acceptable systems. Ask your Rotel dealer for assistance here. It will be worth it!

Speaker Placement

Speaker matching is not the only critical task ahead of you. Proper speaker placement is equally important! In fact, some would argue that placement is even more critical. We'll let the experts argue this one but we will say that proper placement is often the difference between mediocre and superb sound.

The good thing about proper speaker placement is that it doesn't cost extra. After all, you already have the speakers and the room they're going in. The trick now is to put the speakers where they and the room will best complement each other.

Front Speakers

Start with the main speakers. They should flank the monitor but have enough space between them to allow the center channel speaker to function effectively. Also, remember not to place the

left and right speakers too close to the side walls or to close the wall behind them. Read your speaker owners manual for placement advice as the manufacturer should know placement requirements better than anyone else.

If you're still uncertain, begin by using the "rule of thirds." Decide which wall you're going to place the front speakers on and divide that dimension by three. Place the main speakers at those markers. On a twelve foot wall, for example, place the left speaker 4' away from the left wall and the right speaker 8' from the same wall.

This gives you rough placement only. You may have to move each main speaker a bit towards the nearest side wall in order to integrate the center channel speaker effectively but you'll find this out only when you actually play movie soundtracks and music as you "fine tune" the system after you've set everything up.

Ideally, all front speakers (including the center channel) should be exactly the same distance from your main listening position.

Place them in a slight arc — not in a straight line across the front of the room. You'll benefit from higher precision and better integration between dialog and front stereo effects in the resulting image.

If you're using a direct view monitor (a conventional TV) or a rear projection set, you'll have to place the Center speaker either above or below it. Remember to aim the center speaker so that it points at your ears when you're in your favorite listening/viewing location.

Two piece front projectors offer the most flexibility (and, many would argue, the best picture). From a sonic viewpoint, a perforated ("perf") screen is best. A perf screen contains thousands of almost-microscopic holes per square foot. These holes let sound through so you can place the center speaker directly behind the screen at the same height as the main left and right speakers. This ideal placement maintains vertical coherence as sounds pan across the front.

One drawback to a perf screens is that the holes don't reflect light from the projector. Typically, a perf screen results in a 30% brightness reduction compared to a non-perf screen. You'll have to make the decision to use one or the other based on overall room conditions and your viewing preferences.

Surround Speakers
There are few hard and fast rules for surround speaker placement. Some organizations, notably the THX division of Lucasfilm, Ltd., contend that the surround speakers should be placed above and to the sides of your listening/viewing position. Although they present cogent arguments in support of this advice, other authorities argue that placement on the rear wall is equally effective. Remember that the THX advice must be taken in context: THX mandates surround speakers which radiate sound in a "dipolar" pattern that complements side wall placement. (See THX literature for more details.)

Those who suggest rear wall placement are usually very comfortable with direct radiating speakers that generate sound in one primary direction. Your Rotel dealer will gladly explore different possibilities with you.

Subwoofers
Subwoofers, because they deal exclusively with very low frequencies, can be the most difficult speaker to place effectively. You'll need to experiment a bit to determine the best place for them.

Remember that the job of a subwoofer isn't just to produce heart-stopping thuds and growls. A good, properly placed subwoofer must integrate with the rest of your system to produce a continuously smooth response. If you're suddenly "aware" of a separate subwoofer as your system is playing, something is wrong!

Rather than understanding everything about room "modes" and "standing waves" (two topics particularly germane to accurate low frequency reproduction), we suggest the following points as you begin to place your subwoofer:

* Putting the subwoofer close to a wall will give you more bass than if you placed it farther from the wall. On the other hand, the extra bass energy may not be evenly distributed and may sound "muddy" or "lumpy."

* Putting the subwoofer in a corner will give you even more bass but an equally greater chance for uneven response.

* Conversely, placing the subwoofer well away from corners and walls will reduce overall bass levels. Do not assume, however, that the residual bass energy will be evenly distributed.

Try the following trick. Place the subwoofer in your favorite listening position with its driver or port as close to where your ears would be as possible. Play a test tone CD ("warble tones" from about 30 Hz to 100 Hz are best, sine waves are less desirable) and walk around the room until you hear a lot of evenly distributed bass information. You might have to get down and do a bit of crawling closer to the floor to really accomplish this but it will be worth it! In any case, it's much easier to walk (or crawl) around the room yourself than to put the subwoofer in one position, listen from your favorite spot, move the subwoofer to another position, listen again, move it . . . , listen . . . , move it . . . , listen . . . , etc.

What do you listen for? The most important characteristic of good subwoofer placement is that all test tones sound equally loud. You simply don't want any wide variations. If the 70 Hz test band sounds much louder than the 40 Hz band, or if the 80 Hz band is much lower than the 100 Hz tone, something's wrong with the placement. "Experiment" is the key word.

Once you've identified the place in the room where you hear the test tones most convincingly, simply put the subwoofer there. You may have to fine tune the position a little bit but you've already identified the most likely place for proper placement.

The reason this scheme works is that rooms are resonant sys-
tems (something like "acoustic springs") that respond to stimuli
in predictable ways. In this case, your room displays a charac-
teristic called "reciprocity:" It doesn't care if the stimuli (the
subwoofer) is at point A and the evaluation (your ears) is at point
B or the reverse — as long as points A and B remain constant!

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RSP-980 Specifications

Audio

Frequency Response:	5 Hz - 20 kHz, + 0.5 dB
Signal to Noise Ratio (IHF "A"):	100 dB (front), 70 dB (surround)
Input Impedance:	47 k Ohms
Output Impedance:	500 ohms
Total Harmonic Distortion:	0.03 % (@1 kHz)
Intermodulation Distortion:	0.03 % (400 Hz/7 kHz, 4:1)
Output	
Maximum:	> 6 volts
Dolby, 300 mV in:	0.9 volt
THX, 200 mV in:	0.6 volt

Video

Frequency Response:	3 Hz- 10 MHz, - 3 dB
Signal to Noise Ratio:	70 dB
Input Impedance:	72 ohms (S-Video, Composite)
Output Impedance:	72 ohms (S-Video, Composite)
Output level (peak to peak):	1 volt (S-Video, Composite)

General

Power Consumption:	35 watts
Power Requirements (AC):	115 volts 50/60 Hz or 230 volts 50/60 Hz
Weight:	8 Kg/17.6 lb.
Dimensions (W x H x D):	440 x 110 x 316 mm 17.38" x 5' x 12.43"

All specifications were accurate when printed. Rotel reserves
the right to make improvements without notice.

RSP-980 OM rev 5, 7/15/97, Written by TechniCom

RSP-980
SURROUND SOUND PROCESSOR

ROTEL